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ing stouter, each with a conspicuous bristle externally; in having a single spine or tooth above these, and another much stouter, erect, recurved spine, bidentate at tip, below them or at base of tongue, which is here represented by a cordate lobe. There is a spine on the front anterior border of each wing; the legs are all shorter; the prothoracic spiracles less conspicuous; the hairs on abdominal joints shorter; the transverse dorsal teeth smaller and in single row; the basal abdominal joint without spines, but with long stout hairs and the dorsal tubercles of abdominal joints nine replaced by a single spine.

EXPLANATION OF PLATE VI.

(Natural sizes indicated in hair-line.)

FIG. 1.—Larva of *Systachus oreas*, from the side; 1 *b*, head from side, still further enlarged; 1 *c*, same from front; 1 *d*, left maxilla; 1 *e*, left mandible; 1 *f*, mesothoracic spiracle; 1 *g*, pre-anal spiracle.

FIG. 2.—Pupa of *Systachus oreas*, ventral view; 2 *a*, same, side view; 2 *b*, dorsal part of anal end; 2 *c*, prothoracic spiracle; 2 *d*, form of dorsal horny plates and spines on the abdomen.

FIG. 3.—*Systachus oreas*, ♀; 3 *a*, head of same from side; 3 *b*, antenna of same from above; 3 *c*, antenna of same from side; 3 *d*, mouth parts separated.

FIG. 4.—Larva of *Triodites mus* as it appears when contracted prior to pupation; 4 *a*, head from side; 4 *b*, left maxilla; 4 *c*, left mandible.

FIG. 5.—Pupa of *Triodites mus*, ventral view; 5 *a*, same, side view; 5 *b*, dorsal view of anal parts; 5 *c*, form of dorsal plates and spines on abdomen.

FIG. 6.—*Triodites mus*, ♀; 6 *a*, her head, front view; 6 *b*, her right antenna from above; 6 *c*, right antenna from side.

FIG. 7.—*Triodites mus*, ♂; 7 *a*, his head, front view.

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LATE EXPLORATIONS IN THE GABOON.¹

BY HUGO VON KOPPENFELS.

TOWARDS the end of last year I again had the good luck to kill an almost full-grown gorilla, whose length was 1.75 meters, and the width of the shoulders 0.89 meters. This gorilla, and a young female, should, by this time, be in possession of Dr. V. von Kraus, Stuttgart. I, by chance, shot the male gorilla in the vicinity of my stopping place on the Eliva-Comi (an inland lake), so that I was able to take a very good cast of it. I hope to be able to take a cast of the next animal I shall kill, but I cannot predict at what time and place I shall get a full-grown male gorilla, and whether the circumstances will allow me to take a cast of him.

¹ From a letter to Mr. H. A. Ward, Rochester, N. Y.

I have already asserted, and I believe it is proved, that there are crosses between the male *Troglodytes gorilla* and the female *Troglodytes niger*, but for reasons easily understood, there are none in the opposite direction. I have in my possession positive proof of this. This settles all the questions about the gorilla, chimpanzee, Kooloo Kamba, N'schigo, M'bouv  , the Sokos, Baboos, etc.

The French savants seem to have a special predilection for creating new species from variations in the form of the skull, such as often occur in this group of animals.

There is but one district which forms the range of the gorilla, and this is situated in the western part of equatorial Africa, and here it exhibits no varieties, while the chimpanzee is found all over tropical Africa, and naturally exhibits considerable variation. The chimpanzee of Northern Guinea differs essentially from that of the southern portion of the same country, and, according to Livingston, the "Soko" differs from both, but is still a chimpanzee. Du Chaillu's Kooloo Kamba, N'schigo and M'bouv   are not distinct species, and this traveler, who is certainly a man of merit but is too credulous, has been imposed upon by the mendacity of the natives, which beggars description. The names N'schigo, M'bouv  , Koola, Baboo, Soko, Quia and Kooloo Kamba are only different designations of the chimpanzee by different tribes. The mongrel progeny of the male gorilla and female chimpanzee discovered by me, is found, but in individual cases, and as such deserves no special name.

I intend in a few days to start on an excursion to the Crystal mountains over the N'tampuny falls. My purpose is primarily to shoot elephants. Du Chaillu's journey to the Oschebas by the Munin-Tampnay did not extend far, as I accomplished, last year, the same distance in six days' marches. I found the population harmless though somewhat suspicious. The whole district is almost unknown, as I encountered, the second day, members of entirely new tribes on the Yoko, Manga and later the Akuke. The population of this region is continually migrating from the north-east to the south-west, and no one will ever succeed in sifting out the relationship of these commingling tribes.

As a point of departure for penetrating the interior from the west, this seems to be one of the most promising. In all directions are districts which are as yet entirely unknown. On the

north one could in a short time reach the Buiné, a tributary of the Niger; at an equally short distance in a south-easterly direction, one would reach the Sihari, which empties into Tode lake. The district which it drains also forms the water shed of some of the tributaries of the Congo. Had I the means I would not hesitate to begin this important and promising exploration. With a fund of only \$10,000, I would venture upon the undertaking.

From what I have been able to learn, I am led to believe that the mountains of the interior consist of three parallel chains running from N.N.W. to S.S.E., having an average height of about 400 to 500 meters. With the volcanic cone of Cameroon 3600 meters high, and which stands opposite Fernando Po, begins a line of elevation which takes a more southerly direction, and with its continuation south of the Ogowé, the Sierra Compleda, forms the border or palisade mountain range of West Africa. In these mountains, protrusions of granite, generally micaceous, are everywhere visible. Adjacent to this is a reddish-yellow sandstone and slate, often succeeded by a hard gray granite. On the table lands and in the valleys I have observed hard quartzose sandstone of varied colors, elsewhere a light gray quartzite with veins of glassy quartz, and large tracts of crystalline slate. The outcrops of all these strata follow the line of bearing of which I have spoken above. The dip of the layers is different in different places, but is generally eastward at a high angle.

Floods do not occur here as the Muni is formed by the Congu-O'tongo, Banji, Tampuny and Noya, all of which with the exception of the latter are short, because the mountains come so near to the bay; but the Noya flows through a plain in a broad curve parallel with the shore of Corisco bay. Toward the Munda, and with this river the Como and the Rembo—both of which empty into the Gaboon—receive their waters from the Crystal mountains. This chain forms the water shed between these rivers and the tributaries which flow northward into the Ogowé.

The mountains south of the Ogowé, and which run parallel with the Loango coast, have the same general character as the Crystal mountains, but have more bog iron ore on the woody slopes than they, and contain less quartz.

In the rapids of the Ogowé, near Ogota and Okanda, the rocks consist of gneiss which weathers into wonderful imitative forms.

On the Eliva-Comi and the Sette-Comi, Nyangu, which owe

their origin to the sand heaped up along the shore by the very strong surf, we find, among transported stones, roundish masses of quartz which, when broken, show the most beautiful quartz crystals.

The effect of the tides is felt in the labyrinthine estuary of the lower river districts as far as forty miles into the interior. Here the tides act like a dam checking the flow of the rivers, which in the rainy season rise four or five meters, and thus all the adjacent country for many miles is inundated.

With the exception of a few higher points where forest trees grow, the vegetation of this swampy lowland consists mostly of thickets of mangrove, from whence comes, under the stimulus of the tropical sun, the *aria cativa* (malaria) so fatal to Europeans. It is extremely dangerous to travel through the districts where the air is impregnated with poisonous exhalations, and efficient prophylactic measures must be taken if one would escape. It has been my custom to take for this purpose one or two doses daily of quinine, and to wear a respirator of fine wire gauze over my mouth. In the evening I bathe the entire body with salicylic acid mixed with a few drops of spirits of ammonia and of glycerine.

Further up the stream, and beyond the mangroves, and where the water is less saline, we find the Pandanus, the wild date palm (*Phoenix spinosa*) and the trunkless Raphia, which forms tangled thickets. All these plants, as well as the Bombax (*Eriodendron anfractuosum*), though the latter least, endure the brackish water, but grow quite as well where the water saturating the soil is fresh. On banks which are not reached by the high water, the Bombax rises to a respectable height, and can be seen from a great distance overtopping all the associated plants. This tree throws out strong buttresses which reach up to one-third of the height of the trunk, protecting it from fracture to which its tender wood would be exposed as well as from being uprooted. The above mentioned palm trees and Pandanus form the foreground to the forest of tall trees which covers the highlands of the interior. In this zone the mangrove is replaced in the shallow water by a species of papyrus which sometimes covers large tracts. In time of flood, matted masses of it many rods square are lifted from their anchorage and carried even into the ocean, where they often surprise and mislead navigators.

It is quite beyond my power to fitly describe the forests of the interior, for here stand in a motley mixture the Scitamnaceæ, the Malvaceæ, the Orchidaceæ, Euphorbiaceæ, the Araceæ, the Bombaceæ, etc. To disentangle this confusion would require a first rate botanist. No writer can give a just description of a primitive tropical forest; it is too grand and diversified; but with all its exterior splendor and beauty, it is a deceitful and dangerous thing. Woe to the inexperienced man who essays to penetrate into its interior; he soon becomes involved in a chaos of roots, of interlacing lianas, of fallen trunks, covered with a tangled growth of thorny underbrush, all growing from a dank and swampy soil. Here he breathes a stagnant, musty, greenhouse air, which depresses the spirits and deadens the energies. Added to this there is a deep gloomy silence which broods over this place of most luxuriant growth and rapid decay. Although these mysterious shadows hide an active and varied animal life, the ear is seldom struck by a sound of any kind. Only now and then the falling of a fruit or a dry branch breaks the oppressive stillness. Early in the morning and in the short evening twilight of the tropics, some birds are heard to herald the advent or departure of the day. Such a forest is a subject of unending study, and only he whom nature has endowed with peculiar tastes and acute senses can, with use and experience, become familiar with its varied constituents, its changing phases and its silent language. Woe to the novice who without guide wanders into its recesses, where death lurks for him. In most cases he is soon hopelessly lost, and when weary and despairing he throws himself on the ground to rest, swarms of ants and other insects soon sting him into movement again. Almost no wholesome food is attainable in these forest depths, and should the traveler not die of starvation, or fall a victim to violent, acute fever, the poisonous atmosphere, slowly acting on the system, paralyzes the digestion, corrupts the blood, and produces irritating eruptions of the skin, and frequently malignant ulcers. Such is the primitive forest on the alluvial bottoms of the rivers of tropical Africa. It has been represented as a paradise, and poetical descriptions, drawn from the imagination, have inspired in many, a longing desire to penetrate their mysteries. One must, however, do as I have done, wander lost and alone for days together, enduring terrible suffering and constant fear of death before he can form for himself a true image of the real tropical primeval forest.

Among the errors current in regard to the tropical forest, is the common impression that they are full of dangers from the wild animals which inhabit them. Such dangers are, however, for the most part imaginary. Far up on the highlands of the interior, away from the rivers, the atmosphere is pure, and animal life abounds, but there the forest is, for the most part, replaced by savannahs. These, with a rolling surface covered with luxuriant grass, here and there set with picturesque groves, resemble great deer parks, in which herds of elephants, buffaloes and antelopes of many species find abundant food. In the country about the Gaboon the mammalian fauna is, on the contrary, very poor in species, but it has the crowning interest that it includes the great anthromorphous apes, *Troglodytes gorilla* and *Troglodytes niger*. Here are none of the large antelopes, giraffes, gnus, zebras, quaggas, rhinoceroses, gazelles, lions, ostriches, etc., which abound in the interior. The leopard is common, the black variety is occasionally seen, but rare. Of wild hogs there are a few bands of *Phacochærus*, and in greater number, *Sus penicillatus*, the former with gigantic tusks, the other with long face, tufted ears and tail. Only a few jackals and hyenas are found, and during my six years of roaming, I have shot but one of the latter; it was the large spotted hyena. The *Mystomys velox*, which belongs to the Insectivora, is found, though rarely, along the banks and shores of rivers or lakes, hunting after crabs and fishes. From similar glands it diffuses a musky smell like that of the civet. Otters occur, also the African porcupine, and an animal resembling the great ant-eater, *Myrmecophaga jubata*; the latter is found only in South America, but a native offered to sell me at a trading post in the interior, a large and fresh skin with the long haired broom-like tail, remarkably like this species.

Beside the gorilla and chimpanzee, the monkey tribe is represented by the mandrill with the blue face, and by the long tailed dog-faced baboons, as also the black four-fingered very timid and nimble *Colobus niger*, *Cercopithecus cephus*, *C. erxlebeni*, *C. ethiops*, *C. erythropyga*, as asserted by my friend Dr. Pecknel.

In the rivers and lakes there are hippopotami which sometimes, but rarely, go down to and into the ocean. The manatee, being much hunted for its delicious flesh by the natives, who are extremely skillful in throwing the harpoon, is continually decreasing in numbers, and will probably suffer the fate of her sister of the salt water.

There are here two kinds of crocodiles, *C. tetraspes* and *C. cataphractus*; the latter resembles the East Indian Gavial in size and the form of its muzzle, while the former is more like the caiman; I have never heard that any one has here been injured by them, and yet both species, in the Camaroon near the Congo, make victims of many of the natives.

A leather-backed turtle, *Aspidonectes aspilus*, is found here, and the waters abound in fish, but they seem to me far inferior to our common European species. This may, however, be in part due to the very rude manner in which they are prepared for the table.

Of serpents there exist the following kinds: first, the slender, pointed-headed, harmless tree snakes; second, various sorts of water snakes, of which the names are unknown to me; third, we find here the largest of serpents, the python. Exaggerated reports of the size, strength and voracity of these snakes are current in the mouths of the people, and even yet in scientific books. I have frequently met with them; I even once stepped on the tail of a python eighteen feet long, which was lying stretched at full length on the ground in the torpor of digestion. To be sure it took it in bad part, but fortunately I did not give it time to fully declare its intentions, for a hasty shot of my gun laid it writhing at my feet.

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PUEBLO POTTERY.

BY EDWIN A. BARBER.

THE ancient *Pueblos* were the only aboriginal people within the limits of the United States who possessed the art of glazing their pottery. Their descendants, the Pueblo and Moqui Indians of New Mexico and Arizona, are the only tribes which manufactured a lustred ware, that remained, until a year or so ago, comparatively uninfluenced by civilization. The art may have deteriorated in some respects during the past century, yet some of the original forms of vessels have been preserved from a remote antiquity. Many of the modern productions are almost identical in shape with specimens which have been found in ancient graves and amongst the ruined buildings in the valleys of the Rio San Juan and the Rio Grande del Norte; yet the influence of Caucasian refinement has, to a certain extent, begun to show itself in the imitation of objects of recent introduction, and